EPA New England

RISK UPDATES

Number 3 August 1995

RISK UPDATES is a periodic newsletter prepared by EPA New England region risk assessors in the Restoration and Revitalization Branch. This newsletter updates the Supplemental Guidance for Risk Assessment for the Superfund Program (EPA 901/5-89-001) and provides information on new regional guidance. Risk Updates is distributed to contractors supporting Superfund and RCRA, regulators, and interested parties. Risk assessment questions may be directed to the following EPA scientists (area code 617):

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Additional ecological technical support is provided by Ken Finkelstein (223-5537) of the National Oceanic Atmospheric Administration (NOAA) , and three US Fish & Wildlife scientists: Steve Mierzykowski (207)827-5938, Ken Munney (603)225-1411, and Tim Prior (401)364-9124.

We'd like to welcome back Sarah Levinson who has just returned to the EPA New England after having worked at EPA's Headquarters Office and in Indiana. In her new role she will be performing a variety of risk related functions for the Federal Facilities Superfund Section.

Stephanie Carr recently joined the RCRA Corrective Action staff as a human health risk assessor and RPM. Stephanie has coordinated technical and scientific training for EPA New England since 1993.

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DATA USEABILITY IN RISK ASSESSMENT

Introduction

Data useability may be defined as the process of assuring that the quality of the data meets the intended uses. It is a comprehensive process which verifies whether data quality objectives (DQOs) are met based on problems identified during sampling and analysis.

Data useability is different from data validation. Data validation is the standardized process by which analytical error is assessed. Data useability, however, considers both analytical and field error. Since field error is often a major source of the total error associated with data, the data validation process cannot fully address data useability. For this reason, the term "validated data" may not be synonymous with "useable data".

To obtain useable data for human health risk assessment, DQOs must be adequately defined at the work plan stage. End users (site managers, risk assessors, hydrogeologists. engineers) must be involved at the DQO planning stage to ensure that their data needs will be met.

Approach

The human health risk assessor should interact with a technical case team consisting of a chemist.

hydrogeologist and ecological risk assessor when assessing the useability of data at a hazardous waste site. To assess the useability, the risk assessor should evaluate the following three criteria: analytical data quality, field sampling, and data quality objectives.

Analytical Data Quality The human health risk assessor should evaluate the validation reports for the data to be applied in the risk assessment and assess any limitations on data useability. As part of this evaluation, the following components should be assessed and discussed:

- Data validation tier and results.
- Limitations associated with data identified with a "J" qualifier (as they pertain to stated DQOs).
- The affect of unuseable data (e.g., rejected data) on exposure estimates.
- Data quality indicators such as completeness, comparability, precision and accuracy.
- Analytical detection limits (e.g., sample quantitation limits [SQLs]) and whether they meet the DQOs.

Field Sampling The human health risk assessor should evaluate field trip reports to assess any limitations on the useability of site data due to the sampling methodology(ies) or due to complications with or modifications of the approved field sampling protocols. The evaluation should include reports on the following factors and their impacts on data useability.

- Relevant field conditions and sampling problems.
- Field QC results.
- Adequacy of the sample design in achieving DQOs.
- Data quality indicators, such as completeness, comparability, and representativeness.

Data Quality Indicators The human health risk assessor should also evaluate the data quality indicators and DQOs specified in the Remedial Investigation report. This evaluation should focus on whether the DQOs have been satisfied.

Application in Risk Assessment

Before completing an evaluation of data useability, consult EPA's Guidance for Data Useability in Risk Assessment (OSWER publication 9285.7-09A). The risk assessor should also consult with the site chemist and hydrogeologist and discuss the extent to which the above criteria were met for data applicable to risk assessment. A summary of the risk assessor's findings for each of the data useability criteria listed above should be presented as a subsection of the Hazard Identification. This subsection should explain how the results of the data useability assessment affect which data are used in the risk assessment and explain why certain data are not used in the risk assessment. Finally, the risk characterization section should discuss how the data useability affects the uncertainties and limitations associated with the conclusions of the risk assessment.

written by Ann-Marie Burke

RISK-BASED SCREENING OF CONTAMINANTS FOR HUMAN HEALTH RISK ASSESSMENT

Chemicals of concern (COCs) are chemicals identified at a site that may be hazardous to human health or the environment. COCs, a subset of the complete list of chemical contaminants reported in site media, are carried through the quantitative risk assessment process and focus the analysis on the most likely risk "drivers". The COC screening guidance outlined in this article is intended to be followed after the data have been evaluated for data quality and useability. Relevant EPA guidance includes Risk Assessment Guidance for Superfund (RAGS) (EPA/540/1-89/002) and Guidance for Data Useability in Risk Assessment.

At Superfund sites, the baseline human health risk assessment process can be streamlined by applying a conservative risk-based screening step to reduce the number of contaminants carried through the quantitative analysis. EPA New England recommends a screening process that involves comparing environmental concentrations to risk-based concentrations, instead of the relative concentration/toxicity approach which can be costly to conduct.

The COC screening process involves a comparison of the maximum concentration of each contaminant to risk-based concentrations associated with target risks and conservative default exposure assumptions. This screening process does not impact the selection of COCs for ecological risk assessments since chemicals eliminated from the human health risk assessment may still pose ecological concerns.

As part of the COC screening process, EPA New England is adopting Region III's Risk-Based Concentrations (RBCs) with the following modifications:

- The RBC table used for screening noncarcinogens is based on a Hazard Quotient of 0.1 per chemical.

- The residential-based concentrations are applied in the screen.
- Risk-based concentrations derived using toxicity criteria for another route of exposure (i.e., an air concentration based on an oral slope factor) are not applied. Such chemicals should be retained as COCs and discussed qualitatively.

Risk-based COC Screening Procedure

The steps involved in screening COCs for human health risk assessment are listed below.

- For each medium, list the maximum concentration of each chemical detected.
- Tabulate and compare maximum detected concentrations to risk-based concentrations.
- Eliminate chemical in a medium if maximum detection is less than the risk based screening level, where the risk-based screening level is a residential-exposure based concentration associated with 10^{-6} risk level or a hazard quotient of 0.1.
- If the maximum concentration exceeds the risk-based concentration for that medium, the contaminant is retained as a COC for all routes of exposure involving that medium.
- Chemicals that exceed applicable or relevant and appropriate requirements (ARARs) should be retained as COCs.
- If the list of noncarcinogenic COCs is too lengthy, further screening may be conducted in consultation with an EPA risk assessor.

The site risk assessor and remedial project manager may decide to retain a screened out COC if deemed important for site-specific risk assessment purposes. Therefore, it is important to maintain a sublist of all chemicals omitted using this screen.

Presentation in Risk Assessment

Tables summarizing the screening results should be presented in the risk assessment. These tables should contain columns for the following:

- ☐ Maximum detected concentration
- ☐ Detection limit
- ☐ Maximum frequency of detection
- ☐ Risk-based concentration(s) for the chemical in medium specified for this table
- ☐ ARARs
- ☐ Decision to retain as COC
- ☐ Rationale

A discussion of the rationale for retaining a COC should include the potential for dermal exposure which is not addressed by the RBCs.

Footnote

A site risk assessor should be consulted when considering background in the risk assessment. Comparison to background concentrations is not typically considered an appropriate screening step for eliminating chemicals from the quantitative risk assessment. Chemicals present below background concentrations may still contribute significantly to total site risk and therefore should be retained to conduct a complete characterization of site risks. The risks attributable to background levels should be discussed as part of the risk characterization/uncertainty section of the risk assessment. Since the determination of background varies depending on the site contaminants, sampling program, and resources committed to characterizing background, the consideration of background data in the risk assessment requires input and approval by the site risk assessor and remedial project manager or remedial facilities manager.

In addition, risk assessors should keep in mind that risk-based concentrations do not account for potential impacts of soil contaminants on groundwater quality. Therefore, leachable chemicals should be evaluated in the remedial investigation and feasibility study for potential impacts on groundwater. ✍

written by Jayne Michaud

STREAMLINING RISK ASSESSMENTS AT MUNICIPAL LANDFILLS UNDER PRESUMPTIVE REMEDY GUIDANCE

Introduction

EPA has developed presumptive remedies as part of the improvement to the Superfund process. Presumptive remedies are preferred technologies for common categories of sites. They are selected based on historical patterns of remedy selection and EPA's scientific and engineering evaluation of performance data on technology implementation. The presumptive remedy for CERCLA Municipal Landfill Sites is premised on the landfill guidance, Conducting Remedial Investigations/Feasibility Studies for CERCLA Municipal Landfill Sites. The landfill presumptive remedy is the only approach to date that allows for formal streamlining of the risk assessment. The streamlined approach is based on the assumption that the landfill contents will be capped and landfill gas will be properly managed.

Initial Identification of Risk

The key to streamlining the risk assessments at landfill sites is the early identification of an exposure pathway that would require containment of the landfill. Groundwater pathways typically drive a containment remedy at landfills (i.e., a cap). Groundwater contamination and associated risks are easily quantified; therefore, groundwater is a preferred indicator of risks ("driving risks") posed by landfills.

Once a driving risk is identified, all other exposure pathways that will be satisfactorily controlled through the containment of the landfill can be discussed qualitatively in the human health risk assessment. These pathways usually include: direct contact with soil and/or debris, which is prevented by the landfill cap; exposure to contaminated groundwater water within the landfill area, prevented by the landfill cap and/or institutional controls; exposure to contaminated leachate, prevented by leachate collection and treatment; and exposure to landfill gas, which is addressed by gas collection and treatment.

Exposure Assessment

The landfill guidance and presumptive remedy statement include a generic conceptual site model that can be used to identify potential exposure pathways at a landfill site. Using preliminary site data and the conceptual site model, or a site-specific pathway assessment, all of the exposure pathways that relate to the area within the boundary of the landfill can be evaluated in one group.

All site risks associated with areas beyond the area in which the landfill waste was deposited should be fully evaluated in the risk assessment. In addition, certain pathways, such as exposures to landfill gas, may need to be evaluated post-containment to verify that the risk has been adequately controlled. Potential current off-site gas exposures may require quantification at sites where landfill gas is detected in residential or commercial buildings.

"Hot spots" within the proposed containment area should be characterized separately if documentation and/or physical evidence exists to indicate their presence and approximate location. This should occur early in the RI/FS process. Treatment alternatives should be considered for hot spots.

Limitations

It is important to note that the use of the streamlined approach is a deviation from the concept of a baseline risk assessment. The streamlined risk assessment cannot support a no-action or limited action source control decision. A comprehensive risk assessment must be performed if a non-containment remedy is preferred.

A risk assessment using the streamlined approach should have language identifying the presumptive remedy assumptions in the introduction and exposure assessment sections. In addition, the uncertainty section should indicate the use of the presumptive remedy approach and the inability of the risk assessment to estimate risks for a no-action or limited action for source control.

written by Ed Hathaway
Superfund Remedial Project Mgr.

HOUSEHOLD USE OF WATER: INHALATION PATHWAY

This article describes the EPA New England interim approach for qualitatively assessing human health risks posed by exposure to volatile contaminants in drinking water via the inhalation pathway during household use.

Exposure to volatile organic compounds in water may occur indoors through the inhalation route. Volatile compounds may be transferred to the air from tap water via showering, bathing, toilets, dishwashers, washing machines and cooking. The literature suggests that the exposure dose via the inhalation pathway may be as great or greater than the exposure dose via ingestion of drinking water for certain volatile compounds. EPA's Risk Assessment Forum is currently preparing a document which reviews the recent literature and evaluates various models used to estimate exposures via the inhalation pathway. This document will undergo peer review and will be sent to the Science Advisory Board for review as well.

In the interim, EPA New England adopted an approach of qualitatively assessing the exposure and risk from the inhalation pathway as being equal to that of the ingestion pathway for volatile organic compounds. This approach assumes that the systemic dose from inhalation of volatile compounds during household use is equal to that from ingestion. Thus, the total risk from volatile compounds in water through household use is doubled. This qualitative assessment should be included in the risk characterization of the baseline risk

assessment. We also recommend that a footnote be added to the risk tables indicating that risks due to the inhalation pathway are qualitatively assumed to be equal to risks quantitatively assessed for the ingestion pathway.

This qualitative assessment of risks will not be factored in to the derivation of groundwater cleanup levels. EPA New England believes that the combination of MCLs/MCLGs and a 10^{-6} risk level or hazard quotient of 1 should ensure adequate protection of the receptor via all pathways of exposure.

References

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written by Margaret McDonough

RISK NOTES

Soil Depths Defined

EPA New England uses the 0 to 1 foot soil composite to assess residential/commercial exposures to surface soil contaminants via direct contact (dermal and soil ingestion). This is the depth below which small children are unlikely to dig and is a reasonable furrow depth for gardening exposure. Risks from other soil-related pathways (e.g., inhalation of volatiles or dust) should also be assessed on a site-specific basis.

Subsurface soil exposures are assessed using soil data from 1 to 10 feet. This definition of subsurface soil is based on the general depth of frost penetration in New England soil. Typically, soil is excavated to the depth of frost penetration when constructing a foundation for a house. Mixing of soil occurs due to frost heaving and also due to excavation. EPA assumes that the excavated soil is used as grade; hence, exposures to soil composited from 1 to 10 feet are assessed under the future land use scenario.

The subsurface soil depth defined above is a default value. Depths of frost penetration are variable depending on the location. Other site-specific factors that should be considered when determining the depths to which exposure could occur include: expected land use/zoning; purpose of construction/type of building structure; purposes of construction (excavation for utilities installation can result in subsurface soil moved to surface of residential soil); depth to bedrock: and, depth to saturated zone.

Clarification of Central Tendency and High End Exposures

As described in the August 1994 Risk Updates, exposure point concentrations (EPCs) should be based on the 95 percent upper confidence limit (UCL) on the arithmetic mean for all media except groundwater. For groundwater, EPCs should be based on the arithmetic mean and maximum chemical concentrations. To evaluate central tendency exposures, combine the arithmetic mean with the central tendency parameters. High end exposures should be assessed by combining the maximum concentrations with high end exposure parameters.

Dermal Exposure Guidance

EPA is developing a new revised dermal exposure assessment guidance. In the interim, the New England regional office continues to follow the guidance in Dermal Exposure Assessment: Principles and Applications (EPA/ 600/8-91/ 011B).

This issue of Risk Updates was edited by Jayne Michaud of the Federal Facilities Superfund Section with help from Andres Rodriguez, computer specialist.